ABSTRACT

A high silicon steel that comprises (by wt.) 5-10% silicon, 0.007-1% carbon; less than 0.01% impurities consisting of one or more of Mn, P, S, Cr and Ni; and balance Fe. A process for producing the high silicon steel involves the steps of adding 0.01-1% carbon to a high silicon steel comprising 5%-10% silicon, subjecting the steel to a homogenizing heat treatment in a protective atmosphere i.e. a solutionizing treatment between 1200°C and at a temperature below the melting point of the steel, so that the constant-temp annealing of the steel eliminates most of the second phase in the silicon steel. The tensile ductility and workability of the silicon steel is improved so as to allow for mass production of high silicon sheets with various thicknesses. The process produces high silicon steel sheets in which the microstructure is controlled. In addition, final carbon content can be controlled to obtain high silicon steel sheets with optimal soft magnetism characteristics. The carbon-containing high silicon steel sheets can be utilized as a high strength constructional material at room and moderate temperatures in oxidizing and corrosive environments.